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REF ID: A2129

ARMY SERVICE FORCES
QUARTERMASTER CORPS
CLIMATIC RESEARCH LABORATORY
Lawrence, Massachusetts

(DOCUMENT SECTION)

Monthly Report - 1 July 1944

1. The following reports have been sent to the Office of The Quartermaster General, for the approval of Colonel Georges F. Doriot.

Report No. 83 - 20 June 1944
Uniform for Climatic Zones 2 and 3
(Proposed for revised T/E 21)
Ten Tables and Three Figures

Experimental observations on four uniform assemblies constitute the basis of this report. Two of the assemblies were designed for use by combat troops and two for service troops. They were differentiated further for proposed use into Climatic Zones 2 and 3, respectively. The constituents of the assemblies are as follows:-

Assembly "A" Zone 2

Assembly "B" Zone 2

Basic Items Plus

515 Jacket, Field, Pile, od
511 Jacket, Field, M-1943
625 Hood for Jacket, Field, M-1943
312 Trousers, Field, Cotton, od
115 Socks, Ski, Wool, 2 pair
091.1 Insoles, 1 pair
052 Shoepacs
761.3 Mitten, Shell, Trigger-Finger
M-1943
744.3 Mitten, Insert, Trigger-Finger
M-1943
617 Cap. Field, Pile, od

Basic Items Plus

521 Jacket, Field, Wool
511 Jacket, Field, M-1943
625 Hood for Jacket, Field, M-1943
441 Sweater, High Neck
311 Trousers, HBT
042 Boots, Service, Combat
112 Socks, Wool, Cushion Sole, 1 pr.
051 Overshoes, Arctic, Cloth
761.3 Mitten, Shell, Trigger-Finger,
M-1943
744.3 Mitten, Insert, Trigger-Finger,
M-1943
617 Cap, Field, Pile, od

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DATE 10 Oct 54
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Assembly "C" Zone 3

Basic Items Plus

521 Jacket, Field, Wool
 511 Jacket, Field, M-1943
 618 Cap, Field, Cotton, od
 730 Gloves, Shell, Leather
 731 Gloves, Insert, Wool
 042 Boots, Service, Combat
 051 Overshoes, Arctic, Cloth

Basic Items

421 Shirt, Flannel, od
 242 Undershirt, Wool, od, 50-50

Assembly "D" Zone 3

Basic Items Plus

513 Jacket, HBT
 441 Sweater, High Neck
 618 Cap, Field, Cotton, od
 721 Gloves, Wool, od, Leather Palm
 042 Boots, Service, Combat
 051 Overshoes, Arctic, Cloth
 112 Socks, Wool, Cushion Sole, 1 pr.

Basic Items

221 Drawers, Wool, od, 50-50
 Trousers, Field, Wool, od

Each of the four assemblies without modification was tested extensively in the Cold Room and in the All Weather Chamber in the laboratory and, to a limited extent, in the field on two winter field trips and several field marches. Thermal insulation when wet and when dry, moisture pick-up, comfort and design were emphasized in the studies in the laboratory. In the field, comfort, design and military utility were stressed.

Assemblies "A" and "B" proposed for Climatic Zone 2, (Average expected minimum temperature, 0°F.), were similar in thermal insulation as determined by tolerance times and skin temperatures. Their protection as determined by clo values was approximately 2.0. Assembly "A" (for combat troops) was slightly lighter in weight than "B" (for service troops). This is interpreted as advantageous. Likewise, Assemblies "C" and "D", proposed for Climatic Zone 3 (average minimum temperature, plus 32°F.), were similar in thermal insulation. Their clo values were approximately 1.5.

Since many of the items under consideration were basic and included in each assembly, in some experiments it was possible to compare the values of other items that were not in the basic group. It was discovered that the Jacket, Field, Wool together with the Sweater, High Neck, was slightly warmer than the Jacket, Field, Wool, without the Sweater. It was noted also that the contribution to thermal insulation of the Trousers, Field, Cotton, od, as an outer garment in Assembly "A" was not significant.

Thermal insulation of Assemblies "A" and "B" was investigated after wading, and Assemblies "C" and "D" after exposure to an overhead rain. Reduction in tolerance times was approximately 40 percent for each assembly in comparison with the uniforms dry.

It was concluded that each of the four assemblies was basically sound and adequate for the climatic conditions and troops for which it was

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intended. Certain minor modifications evolved from this study, however, would appear to improve the utility of the gear. The Cap, Field, Pile might be replaced by the Cap, Field, Cotton, od, and the Jacket, Field, Pile might be replaced by the combination of the Jacket, Field, Wool and Sweater, High Neck. Finally, the Cap, Field, Cotton, od would be a more useful item if it did not shrink; and the Jacket, Field, Wool would be more acceptable if the closure were improved and the design modified so that it does not bind under the arms.

Report No. 84 - 29 June 1944

Fuels, Arctic, for Heating Rations

A Comparison of Caloric Output and Suitability of
Twenty Solid Fuels Composed of One of Four Basic
Ingredients.

Twelve Tables and Five Figures

Twenty types of fuels were studied, each of which contained one of four basic fuel ingredients. The basic ingredients were paraffin, alcohol, trioxane or metaldehyde.

The performance of the types was considered in regard to delivery of Calories per Gram and Calories per Minute. When material was supplied in a container, the weight of this was considered also. Laboratory tests were performed at plus 75°F., 0°F., minus 20°F., and minus 40°F., respectively, under conditions of no wind and with a 6 mph. wind. In a few instances the fuels were studied in the field. The ambient temperatures in the field ranged from minus 20°F. to plus 45°F., with varying wind velocities.

There were six types that were most efficient insofar as delivery of Calories per Gram and Calories per Minute were concerned. They are as follows:-

Nos. 1 and 2, containing a paraffin base.

Nos. 7 and 9, containing an alcohol base.

Nos. 10 and 12, containing a metaldehyde base.

Fuel No. 1 delivered more Calories per Gram than any fuel studied except for a small size alcohol fuel No. 5-A. Fuel No. 2 delivered the largest number of Calories per Minute. Fuels No. 1 and 2 are not wholly satisfactory because they are luminous, soot the cooking utensils badly and produce irritating fumes when used in small tents.

Fuels Nos. 7 and 9 are efficient substances, but they must be dispensed in a metal container which reduces appreciably their heat output per unit weight of material transported.

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Fuels Nos. 10 and 12 were found to be as satisfactory as any of the types tested. Each fuel is less efficient in a 6 mph. wind than in still air and less efficient at subzero temperatures than at plus 75°F. In their present state they would be satisfactory for heating rations in the field at the latter temperature, but hardly in the former temperature range.

2. In the Provisional Reports during the past month, tests on the following items were discussed:-

Water-Repellency, Experimental Jackets and Trousers

Protective Cases for Sleeping Gear

Windshield, Glass Cloth for Cookset, Mountain

M-1943, Mitten Shell, Trigger-Finger, Experimental,
Moisture Uptake

Uniform Simplification

Cold Climate, Footgear, Traction of Same

Hood For Jacket, Field, M-1943

Glove Liners, Nylon and Rayon, Thermal Insulation

Jackets, Field, Pile, Experimental

Vapor Barrier Sockgear

Mask, Field, Pile, Experimental

JOHN H. TALBOTT
Lt. Col., MC
Commanding